Amendments to the Claims

Please cancel claims 2 and 4. Please amend claims 1, 10, 11, 15, 18-24. Please add new claims 25-28. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Currently amended) A method for encoding data channels in a CDMA system having data channel interference cancellation, comprising the steps of:

~~identifying~~ generating a non-orthogonal pilot signal by modulating a pilot signal using a pilot channel code that is non-orthogonal to codes used to modulate other channels;

mixing a data signal having an in-phase portion and a quadrature phase portion with a specific user channel code;

producing resultant signals ~~using an output signal which is generated during mixing of the data signal~~ by summing the non-orthogonal pilot signal and the mixed data signal;

modulating the resultant signals using a PN code;

baseband discriminating the in-phase and the quadrature phase portions of the data signal to produce second resultant signals;

modulating the discriminated in-phase portion and quadrature phase portion of the data signal;

forming a composite output signal; and

transmitting the composite output signal to a base station.

2. (Canceled)

3. (Original) The method of claim 1, wherein said mixing step comprises the step of:

modulating the data signal using the specific user channel code.

4. (Canceled)

5. (Original) The method of claim 1, wherein said baseband discriminating step comprises the step of:

spreading the in-phase portion and the quadrature phase portion of the data signal.

6. (Original) The method of claim 5, wherein said spreading step comprises the step of:

modulating the in-phase portion and the quadrature phase portion of the data signal using channel separation signals.

7. (Original) The method of claim 6, wherein said separation signals are orthogonal functions.

8. (Original) The method of claim 1, wherein said modulating the discriminated in-phase portion and quadrature phase portion of the data signal comprises the step of:

modulating the discriminated in-phase portion and the discriminated quadrature phase portion of the data signal using respective cosine and sine functions.

9. (Original) The method of claim 1, wherein said forming step comprises the step of:

summing the second resultant signals.

10. (Currently amended) An apparatus for encoding data channels in a CDMA system having data channel interference cancellation, comprising:

means for ~~identifying~~ generating a non-orthogonal pilot signal by modulating a pilot signal using a pilot channel code that is non-orthogonal to code used to modulate other channels;

means for mixing a data signal having an in-phase portion and a quadrature phase portion with a specific user channel code;

means for producing resultant signals ~~using an output signal which is generated during mixing of the data signal~~ by summing the non-orthogonal pilot signal and the mixed data signal;

means for modulating the resultant signals using a PN code;

means for baseband discriminating the in-phase portion and the quadrature phase portion of the data signal to produce a second resultant signal;

means for modulating the discriminated in-phase portion and quadrature phase portion of the data signal; and

means for forming a composite output signal.

11. (Currently amended) A method for decoding data channels in a CDMA system having data channel interference cancellation, comprising the steps of:

receiving a composite signal at a base station, the composite signal comprising an original data signal encoded with an original non-orthogonal pilot signal;

decoding the composite signal to generate first resultant signals;

demodulating the first resultant signals using a PN code to generate second resultant signals;

demodulating the second resultant signal using channel separation functions to generate demodulated resultant signals;

mixing the demodulated resultant signal with channel code data;

filtering mixed demodulated resultant signals to generate demodulated data signals and a demodulated non-orthogonal pilot signal, the demodulated data signals including data signal interference, the data signal interference being introduced into the original data signal as a result of the original data signal being encoded with the original non-orthogonal pilot signal, the demodulated non-orthogonal pilot signal including pilot signal interference, the pilot signal interference being introduced into the original non-orthogonal pilot signal during demodulation;

filtering the non-orthogonal pilot signal to remove the pilot signal interference from the demodulated non-orthogonal pilot signal in order to regenerate the original non-orthogonal pilot signal;

generating ~~pilot signal~~ data signal interference terms that represent the data signal interference in the demodulated data signals, the data signal interference terms being derived from the regenerated non-orthogonal pilot signal;

subtracting the ~~pilot signal~~ data signal interference terms from the demodulated data ~~signal~~ signals; and

performing a dot product calculation using the filtered non-orthogonal pilot signal and in-phase sub-band portions and quadrature sub-band portions of the data signals to generate a decoded composite output signal.

12. (Original) The method of claim 11, wherein said decoding step comprises the step of:

demodulating the composite signal using respective cosine and sine functions.

13. (Original) The method of claim 11, wherein said demodulating the second resultant signal step comprises the steps of:

despreading the second resultant signal with respect to the in-phase sub-band portions and quadrature sub-band portions of the data signal using a first channel separation signal and a second channel separation signal, respectively; and

despreading the second resultant signal with respect to the in-phase sub-band portions and the quadrature sub-band portions of the data signal using a third channel separation signal.

14. (Original) The method of claim 13, wherein the second channel separation signal is a complex conjugate of the first channel separation signal.

15. (Currently amended) The method of claim 14, wherein the first channel separation signal and the ~~scond~~ second channel separation signal are orthogonal functions.

16. (Original) The method of claim 11, wherein said mixing step comprises the steps of:

demodulating non-orthogonal pilot signal components of the demodulated resultant signals using the channel code data; and

demodulating in-phase sub-band portions and quadrature sub-band portions of the demodulated data signal using a specific user channel code.

17. (Original) The method of claim 11, wherein said filtering step comprises the step of:

performing an integration and dump.

18. (Currently amended) [[The]] A method ~~of claim 17,~~ for decoding data channels in a CDMA system having data channel interference cancellation, comprising the steps of:

receiving a composite signal at a base station;

decoding the composite signal to generate first resultant signals;

demodulating the first resultant signals using a PN code to generate a second resultant signal;

demodulating the second resultant signal using channel separation functions to generate a demodulated resultant signal;

mixing the demodulated resultant signal with channel code data;

filtering mixed demodulated resultant signal to generate a demodulated data signal and a demodulated non-orthogonal pilot signal;

filtering the non-orthogonal pilot signal to remove interference;

generating pilot signal interference terms;

subtracting the pilot signal interference terms from the data signal; and

performing a dot product calculation using the filtered non-orthogonal pilot signal and in-phase sub-band portions and quadrature sub-band portions of the data signal to generate a decoded composite output signal; and

wherein said filtering includes performing an integration and dump, said integration and dump further comprises the steps of:

comparing code lengths of the demodulated data signals to each other;

multiplying matching code lengths of the demodulated data signals; and

integrating multiplied and matched code lengths of the demodulated data signals.

19. (Currently amended) The method of claim 11, wherein said step of generating ~~pilot signal~~ the data signal interference terms comprises the steps of:

modulating the demodulated non-orthogonal pilot signal, using the channel code data to generate resultant output signals; and

modulating the resultant output signal [[,]] using a specific channel code of a user to generate a first ~~pilot signal~~ data signal interference term and a ~~forth~~ fourth ~~pilot signal~~ data signal interference term.

20. (Currently amended) The method of claim 19, further comprising the steps of:

subsequent to modulating the resultant output signals [[,]] using a specific channel code of a user, modulating the resultant output signals using a first channel separation signal and a second channel separation signal to generate a second ~~pilot signal~~ data signal interference term and a third ~~pilot signal~~ data signal interference term.

21. (Currently amended) The method of claim 19, wherein the first channel separation signal and the second channel separation signal are orthogonal functions.

22. (Currently amended) The method of claim 11, wherein said step of performing a dot product calculation comprises the steps of:

modulating cosine portions of the in-phase sub-band portions and cosine portions of the quadrature sub-band portions of the data signal [[,]] using a cosine portion of the demodulated non-orthogonal pilot ~~signa~~ signal to generate resultant cosine in-phase sub-band portions and resultant cosine quadrature sub-band portions;

modulating sine portions of the in-phase sub-band portions and sine portions of the quadrature sub-band portions of the data signal using a sine portion of the demodulated non-orthogonal pilot signal to generate resultant sine in-phase sub-band portions and resultant sine quadrature sub-band portions;

summing the resultant cosine in-phase sub-band portions and the resultant sine in-phase sub-band portions to generate a first composite signal portion;

summing the resultant cosine quadrature sub-band portions and the ~~result sine portions of the~~ resultant sine quadrature sub-band portions to generate a second composite ~~signal~~ portion; and

outputting the first composite signal portion and the second composite signal portion as the decoded composite output signal.

23. (Currently amended) An apparatus for decoding data channels in a CDMA system having data channel interference cancellation, comprising the steps of:

means for receiving a composite signal at a base station, the composite signal comprising an original data signal encoded with an original non-orthogonal pilot signal;

means for decoding the composite signal to generate first resultant signals;

means for demodulating the first resultant signals using a PN code to generate a second resultant signal ~~signals~~;

means for demodulating the second resultant signal using channel separation functions to generate demodulated resultant signals;

means for mixing the demodulated resultant signal with channel code data;

means for filtering mixed demodulated resultant signals to generate demodulated data signals and a demodulated non-orthogonal pilot signal, the demodulated data signals including data signal interference, the data signal interference being introduced into the original data signal as a result of the original data signal being encoded with the original non-orthogonal pilot signal, the demodulated non-orthogonal pilot signal including pilot signal interference, the pilot signal interference being introduced into the original non-orthogonal pilot signal during demodulation;

means for filtering the non-orthogonal pilot signal to remove the pilot signal interference from the demodulated non-orthogonal pilot signal in order to regenerate the original non-orthogonal pilot signal;

means for generating ~~pilot signal~~ data signal interference terms that represent the data signal interference in the demodulated data signals, the data signal interference terms being derived from the regenerated non-orthogonal pilot signal;

means for subtracting the ~~pilot signal~~ data signal interference terms from the ~~data signal~~ demodulated data signals; and

means for performing a dot product calculation using the filtered non-orthogonal pilot signal and in-phase sub-band portions and quadrature sub-band portions of the data signals to generate a decoded composite output signal.

24. (Currently amended) A method for encoding/decoding data channels in a CDMA system having data channel interference cancellation, comprising the steps of:

modulating a non-orthogonal pilot signal using a pilot channel code that is non-orthogonal to codes used to modulate other channels;

modulating a data signal using a specific user channel code;

summing the modulated data signal and the ~~modulated~~ non-orthogonal pilot signal to obtain resultant signals;

modulating the resultant signals using a PN code;

spreading the modulated resultant signals using channel separation signals;

modulating the spread modulated resultant signals using respective cosine and sine functions;

summing the spread modulated signals to form a composite output signal;

transmitting the composite output signal to a base station;

receiving the transmitted composite output signal at a transceiver, the composite signal comprising the data signal encoded with the non-orthogonal pilot signal;

demodulating received composite signal using the respective cosine and sine functions to generate a demodulated composite signal;

demodulating the demodulated composite output signal using a PN code;

demodulating the demodulated composite output signal using channel separation functions to obtain demodulated resultant signals;

~~demodulating the demodulated resultant signals using the respective cosine and sine functions;~~

filtering the demodulated resultant signals to generate a demodulated data signal and a demodulated non-orthogonal pilot signal, the demodulated data signal including

data signal interference, the data signal interference being introduced into the original data signal as a result of the data signal being encoded with the non-orthogonal pilot signal, the demodulated non-orthogonal pilot signal including pilot signal interference, the pilot signal interference being introduced into the non-orthogonal pilot signal during demodulation;

filtering the non-orthogonal pilot signal to remove the pilot signal interference from the demodulated non-orthogonal pilot signal in order to regenerate the non-orthogonal pilot signal;

generating first, second, third and ~~forth~~ fourth ~~pilot signal~~ data signal interference terms that represent the data signal interference in the demodulated data signal, the data signal interference terms being derived from the regenerated non-orthogonal pilot signal;

subtracting the first, second, third and ~~forth~~ fourth ~~pilot signal~~ data signal interference terms from the demodulated data signal; and

performing a dot product calculation to generate an in-phase sub-band data signal and a quadrature sub-band data signal.

25. (New) A method for encoding data channels, comprising:

providing a pilot signal and a data signal;

modulating the data signal onto a data channel;

modulating the pilot signal onto a pilot channel, the pilot channel being non-orthogonal to the data channel, resulting in a non-orthogonal pilot signal; and

combining the non-orthogonal pilot signal and the modulated data signal into a composite output signal that is capable of transmission over a wireless medium.

26. (New) A wireless transmitter for encoding data channels, comprising:

a data spreader that modulates a data signal onto a data channel;

a pilot spreader that modulates the pilot signal onto a pilot channel, the pilot channel being non-orthogonal to the data channel, resulting in a non-orthogonal pilot signal; and

a summer that combines the non-orthogonal pilot signal and the modulated data signal into a composite output signal that is capable of transmission over a wireless medium.

27. (New) A method for decoding data channels, comprising:

receiving a composite signal, the composite signal comprising an original data signal encoded with an original non-orthogonal pilot signal;

demodulating the composite signal into a demodulated data signal that includes data signal interference, the data signal interference being introduced into the original data signal as a result of the original data signal being encoded with the original non-orthogonal pilot signal;

demodulating the composite signal into a demodulated non-orthogonal pilot signal that includes pilot signal interference, the pilot signal interference being introduced into the original non-orthogonal pilot signal during demodulation;

removing the pilot signal interference from the demodulated non-orthogonal pilot signal in order to regenerate the original non-orthogonal pilot signal;

generating data signal interference terms that represent the data signal interference in the demodulated data signal, the data signal interference terms being derived from the regenerated non-orthogonal pilot signal; and

removing the data signal interference terms from the demodulated data signal.

28. (New) A wireless receiver for decoding data channels, comprising:

a wireless interface receiving a composite signal, the composite signal comprising an original data signal encoded with an original non-orthogonal pilot signal;

a data despreader demodulating the composite signal into a demodulated data signal that includes data signal interference, the data signal interference being introduced into the original data signal as a result of the original data signal being encoded with the original non-orthogonal pilot signal;

a pilot despreader demodulating the composite signal into a demodulated non-orthogonal pilot signal that includes pilot signal interference, the pilot signal

interference being introduced into the original non-orthogonal pilot signal during demodulation;

the pilot despreader removing the pilot signal interference from the demodulated non-orthogonal pilot signal in order to regenerate the original non-orthogonal pilot signal;

an interference canceller generating data signal interference terms that represent the data signal interference in the demodulated data signal, the data signal interference terms being derived from the non-orthogonal pilot signal; and

the interference canceller removing the data signal interference terms from the demodulated data signal.